

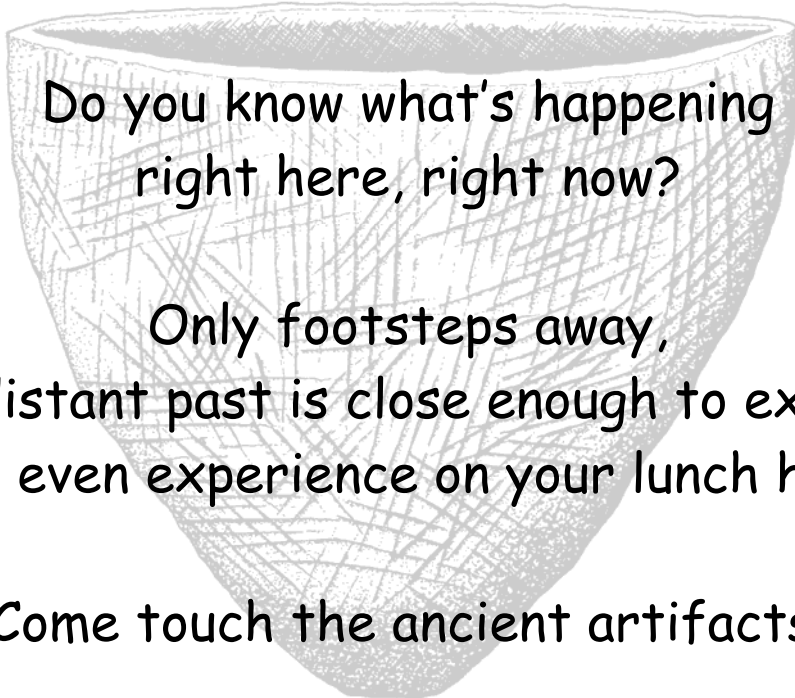
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ARCHAEOLOGY IN DELDOT'S BACKYARD



Do you know what's happening
right here, right now?

Only footsteps away,
the distant past is close enough to explore,
and even experience on your lunch hour.

Come touch the ancient artifacts.

**Where: North and Central
Conference Rooms**

First Floor, Administration Building

When: May 28th, 11:30 am

Come Explore Your Heritage. Dive into the Past with Us.



Experience Archaeology
at the
HICKORY BLUFF DIG

Where: Dover, Delaware

Contacts - For general information:

Kevin Cunningham (302) 739-3826

Michael Petraglia (703) 218-1084

To schedule a tour or visit:

Diane Halsall (703) 934-2339

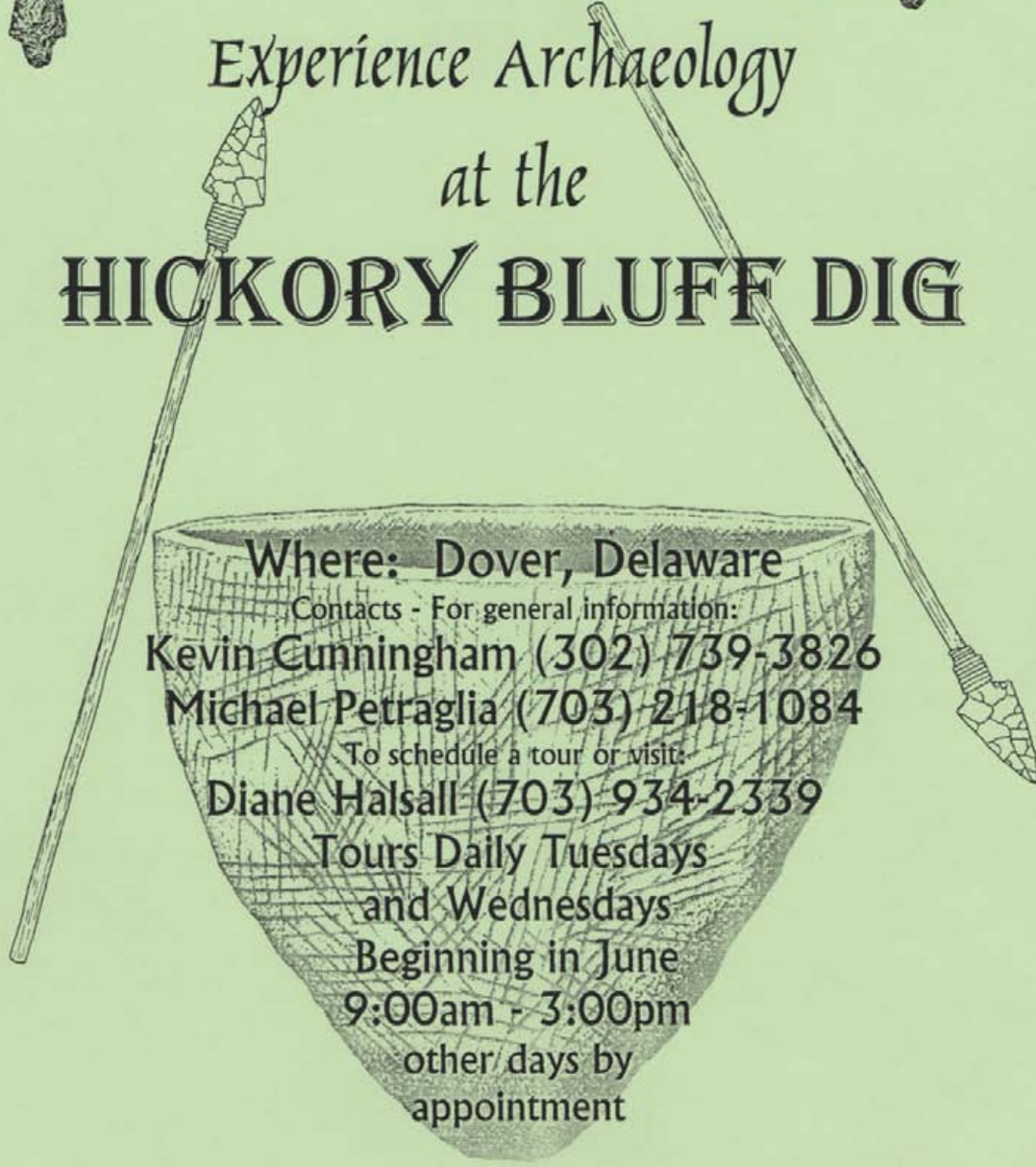
Tours Daily Tuesdays

and Wednesdays

Beginning in June

9:00am - 3:00pm

**other days by
appointment**

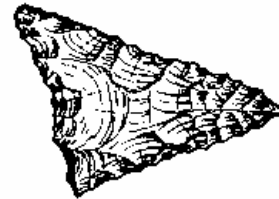
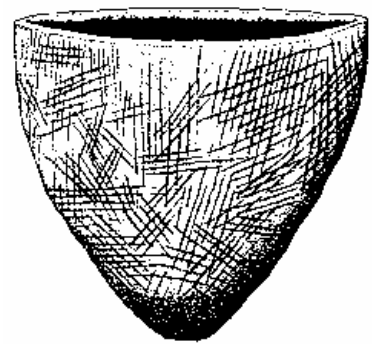


The Hickory Bluff Site

Come see what the excitement is about
Visit the Site, Monday through Friday
Between 9am and 3pm
Off Route 113, behind the Delaware
Department of Transportation
Headquarters



ARCHAEOLOGY IS FUN! CAN YOU COLOR THESE THINGS?
WHAT ARE THESE THINGS?



Fact Sheet on
ARCHAEOLOGY

***WHAT* is ARCHAEOLOGY?**

Archaeology is the study of artifacts that have been left behind by people in the past. An artifact is anything that was made or used by people. We study artifacts left by people in ***history*** and ***prehistory***. Prehistory means more than about 400 years ago, before explorers and colonists came from Europe and Africa, in other words, when the Native Americans were the only people in America. We call it prehistory because “pre” means before, and “history” means to write things down. Archaeologists have never found evidence that Native Americans kept written records. This does not mean that they did not write things down, it is just that we have never found anything with their writing on it. When people from Europe and Africa came to this land, they did write things down, so we call that history, because they kept records.

WHY do ARCHAEOLOGY?

Archaeologists do archaeology to learn about how people lived in the past, both in prehistoric and historic times. They are interested in learning what they ate, where they slept, how they raised their children, what they liked to do, and even how they buried their dead. You may not know this, but the earth holds some very special stories about the past beneath where we walk everyday. People have been around in this country for a long, long time, and they left things behind when they lived here. Archaeologists look for those things that were left behind, and they are called **artifacts**. An artifact is anything made or used by people, old or brand new. Archaeologists are interested in old artifacts, from a long time ago. Archaeologists look carefully, and study the artifacts they find in order to share what they learn with students, and other people. The places in the ground where archaeologists find artifacts are called sites. As long as the artifacts are buried, they are safe from being destroyed, but sometimes people want to build a road or a building where there is an archaeological site. Archaeologists try figure out the stories of the people that used to live on the earth, and they

have to do this before the road or building gets built, because then they will not be able to dig in the dirt. They try to figure out these stories so they can share them with other people. Since the people that left the artifacts are not around anymore to ask questions, archaeologists must study the pieces of their lives that they did leave behind, and these are the artifacts.

Even though those people from a long time ago are gone, some people that are alive today remember how people used to live a hundred, and maybe even a thousand years ago. For prehistoric sites where Native Americans used to live, archaeologists can ask living Native Americans questions about the things they find in the ground. Many stories and traditions have been handed down for many years, and sometimes asking living Native Americans to share stories with us helps us figure out what some of the artifacts were used for. For historic sites where people like our great great grandparents used to live, archaeologists can ask people in the family that are still living about their memories of how people used to live. Sometimes our grandparents remember things that happened many years ago, before some archaeologists were ever born, and the stories they can share with us can help us

figure out some of the things we find in the ground.

After archaeologists study all the artifacts, they use a computer to write a report that tries to create a truthful story about how the people lived a long time ago. By studying how people used to do things in the past, sometimes we can figure out better ways of doing things in our lives today.

***WHERE* do you do ARCHAEOLOGY?**

Archaeology can be done almost anywhere. That includes the woods, a farmer's field, and even in a downtown city. An archaeologist is likely to find clues of ***past life*** almost anywhere they look on ground that is not covered up by buildings or roads. Sometimes archaeological sites are buried way below the ground. When archaeologists are looking for prehistoric sites where Native American people lived, some things can give them good clues that they might find artifacts and sites. For example, if the land is close to a river or stream, there might be a site there, because everyone needed water, including the animals that people hunted for food. When archaeologists are looking for historic sites, they can go to special libraries, and look for old maps and records that people kept in

historic times, and they may tell us where a house from a long time ago used to stand. An archaeologist has to think about how the land has changed over time, remember, the earth has been around for a very long time, and things like weather and even earthquakes has changed what the surface of the land looks like. There were many people living on the earth way before things like buildings and roads were invented.

***HOW* do you do ARCHAEOLOGY?**

Archaeologists use their hands, and their heads to do their work. After an archaeologist finds some artifacts on the ground, they begin digging to see if there are more artifacts buried in the ground. Sometimes archaeologists have to take off a lot of dirt on the top of the ground to find the artifacts that are buried below. Once they have taken off the newer layer of dirt on the ground, they can begin carefully looking for artifacts in lower layers of soil. They call the layers in the soil ***strata***. Archaeologists have to keep track of where each artifact comes from, so they dig in squares called ***units***, that are set up on a ***grid***, which kind of looks like a big piece of graph paper, only laid down on the ground in string. They give each unit a special number. Then they begin taking off

thin layers of soil with a shovel, and a smaller, special tool called a **trowel**. They put the soil into a bucket, then dump the bucket out into a screen. They shake the screen so that the dirt falls out of the bottom, and the artifacts are left in the top. They carefully pick out the artifacts, and put them in special plastic bags, and write on each bag special numbers that tell which unit they came out of. It is very important to write down where an artifact came from, because this can help us better understand what was going on in certain areas of the site. Archaeologists also take samples of the **soil** itself, and do special studies in the laboratory to look for very tiny things, like burned seeds or bits of bone, which can tell what prehistoric people were eating from their environment. After the dig is over, archaeologists clean and study each artifact. Each artifact gets entered into the **computer**, to help create a record that will not get lost. After all the field work and lab work is done, archaeologists write their report on the site, so that other interested people, and other archaeologists, can learn from the finds.

WHO can do ARCHAEOLOGY?

Anyone can do archaeology, this includes **women and men**. An archaeologist has to be willing to put in hard work outside, at the site, as well as at in the **laboratory**, which is where all of the artifacts come to be washed and studied. Once the work at the archaeological site is done, archaeologists must examine, measure, and try to identify each artifact they collected from the site. They do all of this work in the laboratory. After all of the field work and the laboratory work are done, archaeologists use the **computer**. Sometimes, if an archaeologist needs help identifying artifacts, or wants to learn more about something they found, they ask advice from other types of scientists. Some of these similar scientific fields include **anthropology** (study of culture and the origin of people), **geology** (study of the earth and rocks), **history** (study of past events), **paleontology** (study of fossils), **palynology** (study of seeds and pollens), **climatology** (study of weather and climates), and even **biology** (study of living beings and life processes). You must go to **college** if you want to be an archaeologist, or any of these other types of scientists. While in college, you get to learn a lot about archaeology, often

at “field schools,” which are outdoor classrooms where young archaeologists get hands-on training and experience.

ABOUT THE HICKORY BLUFF ARCHAEOLOGICAL SITE

The Hickory Bluff archaeological site is located on the eastern bank of the St. Jones River in Dover, Delaware. ***Parsons Engineering Science, Inc.*** is a company that is helping ***Delaware Department of Transportation*** do the archaeology at this site. This prehistoric site was first identified in 1994, during an archaeological survey. The site lies in the proposed corridor for the Puncheon Run Connector, which will connect Route 1 with Route 113. Phase III archaeological investigations, or an ***excavation***, is being performed on the site so that we can learn as much from it as possible before construction of the road begins. Archaeologists do not often have the luxury of excavating an entire site, so they must determine an appropriate ***sample*** of the site to excavate, enough to allow us to learn as much as possible.

The entire site is over 5 acres in size, and appears to have been occupied by prehistoric people during the ***Woodland I*** period, about 3,000 B.C. - 1,000 A.D. The Woodland I period had two main culture complexes, called the

Barker's Landing (about 3,000 B.C. to 1000 A.D.) and **Delmarva Adena** (about 500 B.C. to 1 A.D). Occupation of this site was not confined to this period, traces of both the earlier Archaic period, and the later Woodland II period have also been found. Artifacts found at Hickory Bluff include spear points and arrowheads, as well as other sorts of chipped stone tools, and pieces of pottery. The **raw materials**, or rock, used to make these stone tools includes both locally available **jasper, quartz, and quartzite**, as well as tools made from rocks that came from further away, such as cuesta quartzite (from northern Delaware), Flint Ridge chert (from Ohio), argillite (from northeastern Pennsylvania and northern New Jersey), and rhyolite (from northern Maryland). The presence of tools made from the rocks that came from further away means that prehistoric people were either doing a lot of traveling to get their resources, trading with other **cultures** further away, or **migrating**. More likely, it was probably a combination of all of these possibilities. The **pottery sherds** that have been found at the Hickory Bluff site have been identified as steatite-tempered Marcey Creek Plain Ware, which was made during the early Woodland I period, as well as later Woodland I pieces of clay tempered pottery, which are associated with the Delmarva Adena complex, represented by several cultures including the Coulbourn, Wilgus, and Nassawango.

This site is very important because in addition to a large number of prehistoric artifacts, a large number of ***pit features*** have been found. The pit features that have been found Pit houses are shallow holes, where people lived underneath bark and reed shelters. There are many pit houses at the Hickory Bluff site, which may mean that people were coming back to this site year after year. Prehistoric people did not remain in one place for very long, they were ***nomadic***, which means they moved around quite a bit each year, according to where ***resources*** like food (animals and plants) and water were located. Archaeologists are able to take samples of the different layers of soil they dig through, and they can use special techniques to find seeds and other tiny plant remains, that help tell us what plant resources were like in the past.

Fact Sheet on Archaeology

WHAT is ARCHAEOLOGY?

Archaeology is the study of artifacts that have been left behind by people in the past. An artifact is anything that was made or used by people, even in modern times. Archaeologists, however, are interested in older artifacts. We study artifacts left by people in **history** and **prehistory**. Prehistory means more than about 400 years ago, before explorers and colonists came from Europe and Africa, in other words, when the Native Americans and our human ancestors were the only people in America. We call it prehistory because “pre” means before, and “history” refers to written records. There are no written records of prehistory.

WHY do ARCHAEOLOGY?

Archaeologists do archaeology to learn about how people lived in the past, both in prehistoric and historic times. They are interested in learning what they ate, where they slept, how they raised their children, how they played, generally, we want to figure out what they did with their time. Archaeologists are also interested in more complicated pieces of past lives, like how communities were organized, or if they were organized at all. We try to find out if they had economies, and if they did, what were they based on? We can do this by studying **artifacts** that have been left behind in the ground. Kinds of artifacts, and distributions of them, give us clues to help develop theories about what was happening at an archaeological site when people were living there. For example, at a prehistoric site, high concentrations of fire-cracked rock may indicate a fire place, or hearth was nearby. At a historic site, high concentrations of broken dishes may indicate an area was used for a dumping ground, or trash pile. Archaeologists study and analyze what they find in order to share what they learn with students, other archaeologists and scientists, and other interested people. Often, the sites that archaeologists study are buried in the ground. As long as they are buried, they are safe from destruction, but sometimes, a project, such as a road or a building, is planned to go through an archaeological site. Archaeologists try to learn as much as they can

about the people who used to live on the land from the evidence they left behind. We dig the site before the project takes place, and then we study the artifacts, and write a report that tries to create a truthful story about how the people lived a long time ago.

***WHERE* do you do ARCHAEOLOGY?**

Archaeology can be done almost anywhere. That includes the woods, a farmer's field, underwater, and even in a downtown city. So many people have lived on the earth for so many thousands of years, that an archaeologist is likely to find evidence of ***past life*** almost anywhere they look on land that has not been too disturbed by buildings, roads, or other big construction projects. Even if the land has been disturbed, sometimes archaeological sites are buried deep below the modern land surface. Some factors, like closeness to natural water sources (rivers, lakes, streams) is a good clue that prehistoric people may have lived there. This is because everyone needed water, and the animals that prehistoric people hunted for food often came to the water. Whether or not people lived someplace in historic times is a little easier to predict, because people started recording information, and making maps as soon as they discovered America. An archaeologist has to take into account how the land has changed over time, remember, everything was wilderness before cities and suburbs started being built.

***HOW* do you do ARCHAEOLOGY?**

Archaeology is physical, as well as mental work. After an archaeologist locates an archaeological site, they begin getting ready to dig. Often, they have to use a backhoe to strip off a large layer of dirt on the surface of the ground. Once they have stripped off the top "modern" layer, if necessary, they lay out a grid. A grid is layed out because archaeologists dig in square units, measuring one meter by one meter. Each unit is carefully numbered, so each artifact can be specifically recorded. In addition to recording which unit an artifact comes from, archaeologists record which level of soil it comes from. Small layers of soil are removed from each unit at a time. These layers are called ***strata***, and are removed with a shovel, and another special tool, called a trowel. The soil is then screened to look for small artifacts that might not be apparent to the naked eye. Some of these small artifacts include flakes of stone produced when people were making stone tools. As they take artifacts out of each unit, they put them in

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**Delaware Department of Transportation and Parsons Engineering
Science**

**Fact Sheet on
Archaeology**

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The artifacts that archaeologists study from Precolumbian times are generally made of very hard material, such as rock. Artifacts, tools, and other items of material culture that were made out of organic, or softer materials, such as wood, decomposed rapidly in Delaware soil.

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WHO can do ARCHAEOLOGY?

Anyone can do archaeology, this includes **women and men**. Archaeology takes a lot of dedication, and an archaeologist has to be willing to put in hard work in the field, as well as at in the **laboratory**, and even writing at the **computer**. Once the work at the archaeological site is done, archaeologists must examine, measure, and try to identify each artifact they collected from the site. They do all of this work in the laboratory. Sometimes, if an archaeologist needs help identifying artifacts, or wants to learn more about something they found, they ask advice from other scientists in jobs that relate to archaeology. Some of these similar scientific fields include **anthropology** (study of culture and the origin of people), **geology** (study of the earth and rocks), **history** (study of past events), **paleontology** (study of fossils), **palynology** (study of seeds and pollens), **climatology** (study of weather and climates), and even **biology** (study of living beings and life processes). You must go to **college** if you want to be an archaeologist, or any of these other types of scientists. While in college, you get to learn a lot about archaeology, often at “field schools,” which are outdoor classrooms where young archaeologists get hands-on training and experience.

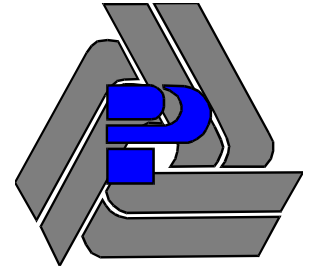
ABOUT THE HICKORY BLUFF ARCHAEOLOGICAL SITE

The Hickory Bluff archaeological site is located on the eastern bank of the St. Jones River in Dover, Delaware. **Parsons Engineering Science, Inc.** is a company that is helping **Delaware Department of Transportation** do the archaeology at this site. This prehistoric site was first identified in 1994, during an archaeological survey. The site lies in the proposed corridor for the Puncheon Run Connector, which will connect Route 1 with Route 113. Phase III archaeological investigations, or an **excavation**, is being performed on the site so that we can learn as much from it as possible before construction of the road begins. Archaeologists do not often have the luxury of excavating an entire site, so they must determine an appropriate **sample** of the site to excavate, enough to allow us to learn as much as possible.

The entire site is over 5 acres in size, and appears to have been occupied by prehistoric people during the **Woodland I** period, about 3,000 B.C. - 1,000 A.D. The Woodland I period had two main culture complexes, called the **Barker's Landing** (about 3,000 B.C. to 1000 A.D.) and **Delmarva Adena** (about 500 B.C. to 1 A.D). Occupation of this site was not confined to this period, traces of both the earlier Archaic period, and the later Woodland II period have also been found. Artifacts found at Hickory Bluff include spear points and arrowheads, as well as other sorts of chipped stone tools, and pieces of pottery. The **raw materials**, or rock, used to make these stone tools includes both locally available **jasper, quartz, and quartzite**, as well as tools made from rocks that came from further away, such as cuesta quartzite (from northern Delaware), Flint Ridge chert (from Ohio), argillite (from northeastern Pennsylvania and northern New Jersey), and rhyolite (from northern Maryland). The presence of tools made from the rocks that came from further away means that prehistoric people were either doing a lot of traveling to get their resources, trading with other **cultures** further away, or **migrating**. More likely, it was probably a combination of all of these possibilities. The **pottery sherds** that have been found at the Hickory Bluff site have been identified as steatite-tempered Marcey Creek Plain Ware, which was made during the early Woodland I period, as well as later Woodland I pieces of clay tempered pottery, which are associated with the Delmarva Adena complex, represented by several cultures including the Coulbourn, Wilgus, and Nassawango.

This site is very important because in addition to a large number of prehistoric artifacts, a large number of **pit features** have also been found. There is much speculation about what these pit features were used for in Precolumbian times, and one theory is that they were used as houses. Some archaeologists think that these pit houses were shallow holes, where people lived underneath bark and reed shelters. There are many pit features at the Hickory Bluff site, which means there was a lot of human occupation occurring at this site year after year. Most people that lived in Precolumbian times were **nomadic**, which means they moved around quite a bit each year, according to where **resources** like food and water were located. Archaeologists are able to take samples of the different layers of soil they dig through, and they can use special techniques to find seeds and other tiny plant remains, that help tell us what plant resources were like in the past.

STRATA facts



Come Explore Your Heritage. Dive Into The Past

Issue 1: The Hickory Bluff Prehistoric Site

The Hickory Bluff Site is the location of the future Puncheon Run Connector, which will connect State Route 1 and US 13, relieving congestion on local roads. The site is located on the east bank of the St. Jones River, in Dover, Delaware. The Federal Highway Administration and the Delaware Department of Transportation recognize the importance of preserving rare and important cultural resources, and have hired archaeologists from Parsons Engineering Science to excavate the Hickory Bluff site, and share the findings with the public.

Between 5,000 and 1,000 years ago, Hickory Bluff was occupied for varying lengths of time by Native American inhabitants. A number of aboriginal peoples camped at Hickory Bluff, which had an ideal environmental setting because of the St. Jones River, and the animal and plant life it supported.

Archaeologists have uncovered a number of features that are thought to be residential structures. This is based on the oval shape of the features and other signs, such as postmolds. The houses would have been made of wood and bark which deteriorated some time ago, thus signs of these residences mainly come from outlines left in the ground. Fire cracked rock clusters, or hearths, have been found, which are excellent signs of residential activity. The hearths were likely used for heat, light, and to cook foodstuffs. Round and basin-like pits have also been uncovered. Since the pits that have been found are usually empty, they may have been used to temporarily store food.

Projectile points made of stone are commonly found on site. Projectile points likely functioned as spears and arrowheads. Among the types of projectile points found on site are the Adena type (500 BC to 0 AD) and the Fox Creek (0 AD to AD 500) type. The native groups made the stone tools out of mainly local materials, from cobbles and pebbles which could be found nearby. Among the materials used were jasper, quartz, and quartzite. More exotic stone materials may have been collected or acquired by trade with other Native American groups living in other parts of the Middle Atlantic, and possibly the Midwest.

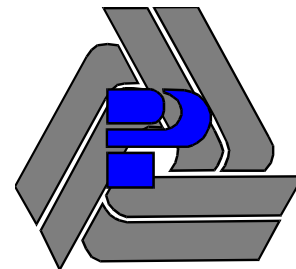
Pottery is also found at the Hickory Bluff site. Various types of pottery of different ages have been identified at the site. Among these are the steatite tempered ware known as Marcey Creek (1200 BC to 800 BC). Clay tempered wares are also being found, including the Wilgus and Coulbourn (400 BC to 0 AD) types, which are the most common types appearing at the site.

To arrange for a tour or to schedule an appointment and help to excavate, contact Diane Halsall at (703) 934-2339.

Hours are 9 am to 3 pm, Monday through Friday.

For more information on the site, please contact

Michael Petraglia, Ph.D., of Parsons Engineering Science at (703) 218-1084
or Kevin Cunningham of DelDOT, (302) 739-3826.



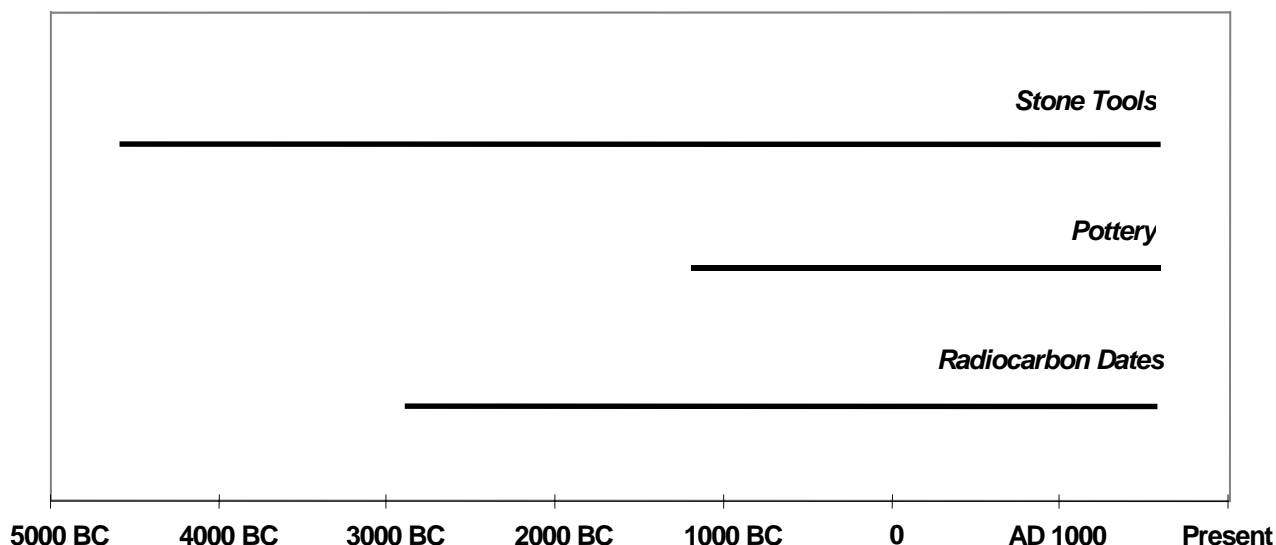
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Issue 2: Chronology – How Old is Old?

People have lived at the Hickory Bluff site for more than 6,000 years. How do we know? How do we determine how old a site is? One way is to develop a site chronology.

The study of time is referred to as **chronology**. There are at least three types of chronological, or time-related information that we can gather from the excavations at Hickory Bluff. Two come from the styles of the artifacts at the site - the stone tools and pottery. The third is the result of laboratory analysis of organic material, such as wood or bone.

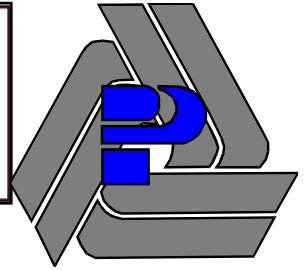
Hickory Bluff Chronology



This chronology chart shows the length of time indicated by each of the types of information collected in the archaeological excavations. There are different time spans represented by each type of information, and together they can be used to refine our knowledge of when the Hickory Bluff site was occupied. Stone tools are the most durable artifacts found at the site. Most types of stone survive virtually unchanged for thousands of years, and so, these tools form the primary source of information about when the earliest people lived at Hickory Bluff. Pottery, on the other hand, was first made in this part of America a little more than 3,000 years ago. Pot sherds provide an additional source of information that can supplement stone tool data in later periods. In contrast to stone or pottery, organic material deteriorates very rapidly. Old material is less likely to survive than more recent material, and so, radiocarbon dates from organic debris are most useful in providing accurate information about later occupations. Organic material often has the additional advantage of providing dates in areas of the site that do not contain artifacts with characteristic or datable styles.

In the end, these different types of information together help us to determine that people have inhabited the Hickory Bluff site at various times from 4500 B.C. to A.C. 1500.

STRATA facts



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Issue 3: So, What's with All These Rocks?

Rocks, rocks, rocks - most of what has been found at the Hickory Bluff site consists of rocks. In fact, this isn't unusual for prehistoric Native American sites.

Stone is the most common type of material that occurs on archaeological sites in the eastern United States. And for good reason.

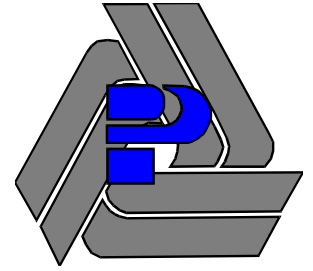
Stone was critical to life in prehistoric societies. Few Native American groups had access to metal before Europeans arrived with iron pots, knives and hoes.

Without metal, stone was the material from which many of the most important tools were made. To be sure, other materials like shell, wood, or bone were used, but stone represented the hardest material available for tool making. Sharp, long-lasting cutting edges could be easily produced, and heavy, battering tools could also be made. Stone was also critical to most fire-related activity, like cooking or heating. Rock that has been reddened, cracked or broken by heating often makes up a large proportion of the artifacts from a site. Archaeologists often use the descriptive term **fire-cracked rock** for these artifacts.

A second reason stone artifacts are so frequently found at archaeological sites is that stone does not decay very quickly. **Organic material** - wood, bone or shell - decays rapidly when exposed to the elements. But rocks deteriorate very slowly. And so, on many archaeological sites they are the only material that remains.

At the Hickory Bluff site, over 95 percent of the artifacts are stone. Most of this material consists of flaking debris, the waste chips knocked off as stone tools were made or resharpened. Fire-cracked rock makes up the second largest type of artifact, and indicates the importance of fire in the lives of the people inhabiting the site. The remainder of the stone artifacts consist of hammers, knives, projectile points and other tools that were either lost or were broken and discarded.





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Issue 4: Hickory at Hickory Bluff



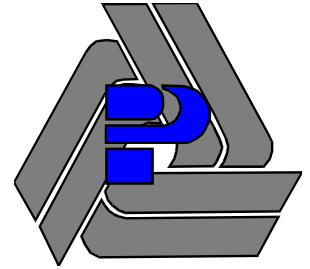
Hickory Bluff -- the site takes its name from the many hickory trees that grow along the bank overlooking the St. Jones River. It is a picturesque setting. And while we can never know what name the Native American groups gave the site, it may have been something similar to Hickory Bluff. We can make this guess because there is evidence that hickory trees have grown along the banks of the stream for as long as people have visited the site.

Hickory is a common tree in the region, and has been so for thousands of years. Hickories are found in groves, like the one at Hickory Bluff, along with oaks, maples, walnuts and other leafy tree species. The wood of the hickory tree was used for fuel, as the identification of charcoal from hearths at the site has shown. Hickory is dense and hard, and it burns very hot - it has been estimated that a cord of hickory wood produces nearly as much heat as a ton of anthracite coal. The hard wood of the hickory was also useful for tool making. It was well-suited for things such as spears or digging sticks, or for hammers or mallets used to beat bark or to flake stone tools.

Early European settlers observed that hickory was the most important nutmeat used by Native American populations at the time the settlers arrived. The nuts were gathered in the early fall. They were crushed and put into water, where the nutmeat was separated from the fibrous shell. The meat was then boiled to extract oils that could be used right away or could be stored for later months. The shell, when dried, was highly flammable and made excellent tinder.

Early historical accounts indicate that hickory had medicinal uses. An infusion or tea was made from the leaves and bark of the tree that was used to treat colds or as a general tonic. Hickory bark was also chewed to relieve mouth sores, and a poultice or dressing was made from the bark to treat arthritis symptoms.

Hickory nuts were probably used by the inhabitants of the Hickory Bluff site throughout its long occupation. A charred nutshell that was excavated from one of the hearth features was sent to the radiocarbon laboratory, where it was dated to around 2900 B.C. This date and several early projectile point styles provide the earliest clear evidence of occupation at the site.

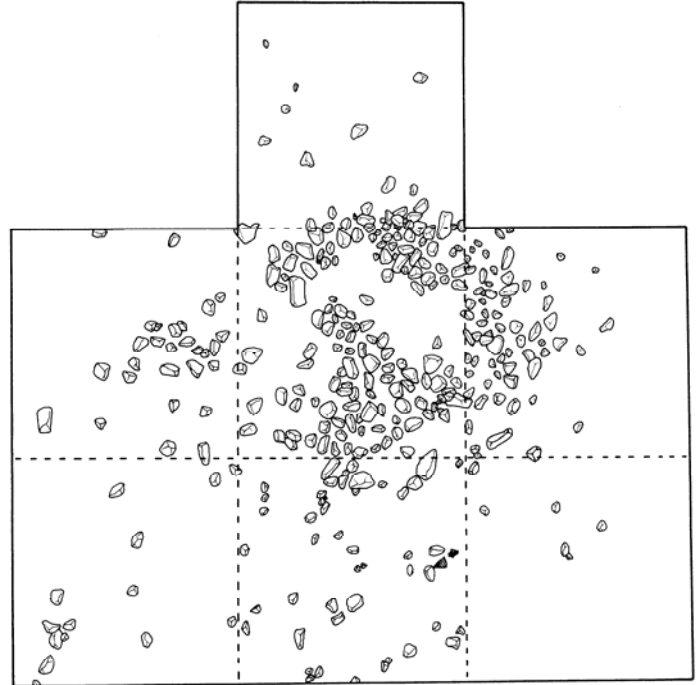


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Issue 5: Home is where the Hearth was?

This is a map of what remains of a hearth feature at the Hickory Bluff site. When we use the word **hearth**, we usually think of a fire built for cooking, or for warmth and light. In fact, the actual use of a feature such as this is not always clear on first observation.

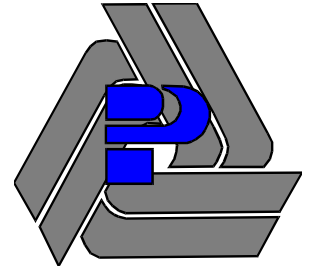
The rocks making up this hearth feature are scattered about, and are probably not in exactly the same places they were when the hearth was in use. After the fire was put out and the site abandoned, the hearth may have laid open for many years. When people came back to the site in another season, they may have reused some of the stones for new fires elsewhere. They may also have kicked the stones around accidentally while walking across the area, or may even have moved some of them purposefully out of the way to avoid stumbling on them. Over the centuries, as the site became buried, tree roots may have grown through the hearth, or rodents may have burrowed through the area, in either case pushing the stones further from their original locations.



And so, it may be hard to determine at first glance whether this was the actual location of the hearth, or whether it was a place where rocks that were no longer needed were tossed to get them out of the way of other activities. How do we decide which it is?

To start, we look in detail at the rocks in the feature. Heating rocks can cause them to crack and eventually to break apart - this has led to the descriptive term **fire-cracked rock** for these artifacts. If the rocks in the hearth feature are in their original location, there is a good chance that some of the broken pieces can be fitted together to form portions of the original stones or cobbles. If none of the pieces fit together, it may be an indication that the fragments have been moved around since the hearth was used.

We can also look closely at what surrounds the rocks in the feature. Fire produces charcoal, and it can bake the ground beneath it, turning it hard and red. Remnants of charcoal or differences in the color and texture of the soil around the rock may indicate that there had been a fire on this spot.



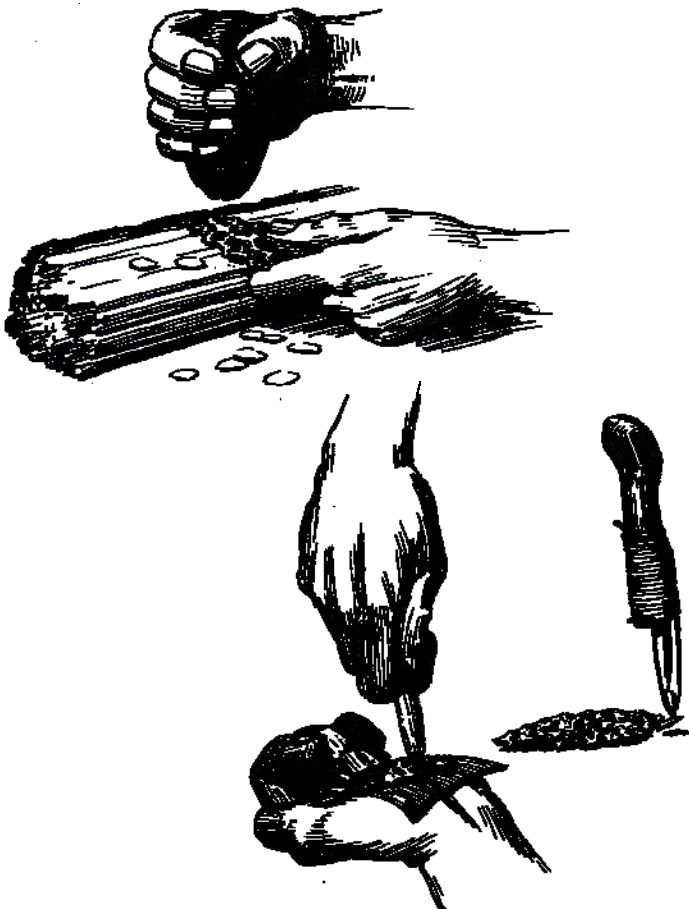
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Issue 5: Stone Tools

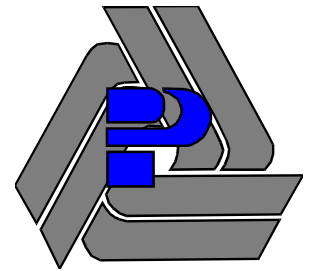
For most prehistoric Native American groups, stone was the hardest material available for making tools. With very few exceptions, people did not have access to metal. Shell, hard wood, or bone was used for many tools, but the toughest and most durable material around was stone.

At sites like Hickory Bluff, stone tools were generally manufactured in one of two ways: by grinding and pecking the stone to form the desired shape, or by chipping fragments from it. Both techniques could be used to make either crude, quickly formed tools or highly crafted pieces of almost artistic quality.

Pecked or **groundstone** tools were often made from heavy, dense material like greenstone. Examples of groundstone implements include axes, hammers, or mortars and pestles, tools for which weight is an important quality.



Stone could also be chipped to produce fine cutting edges. Brittle stone, such as chert, quartz or argillite, that breaks in ways similar to glass, were chosen for these tools. Starting with a large rock, like a stream cobble, chips were struck from the piece with another rock at an angle that removed relatively thin, flake-like fragments. These **flakes** bore sharp edges and could be used immediately as tools for cutting or scraping. Additional flakes were removed to bring the piece to the desired shape. Most artifacts were flaked from alternate sides or faces, and the resulting artifact is termed a **biface**. As the tool took shape, the thick end of a deer antler was often used for more controlled flaking, to refine the form and sharpness of the cutting edge. Final flaking was usually carried out by pressing tiny flakes from the edge with the pointed end of the antler.



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Issue 6: Hearth Stones or Pot Boilers?

The stones that are found in the hearth features at the Hickory Bluff site may have been used in a variety of ways, some obvious and some not. The most obvious use is implied in the name **hearth stone**. These rocks were used to line fire pits or were placed around a fire to contain it or to be used as holders or trivets. Stones were also used frequently in roasting platforms. Here they were laid on the fire to absorb heat and release it at a controlled rate.

Another, less obvious use for heated rock was to indirectly boil liquids. The technique of **stone boiling** or pot boiling is common among populations which do not have containers that could be placed directly in a fire. A liquid was put in a container of material such as wood, skin, or a tightly woven or clay-lined basket. Stone cobbles were heated in a fire and dropped into the liquid. The stones quickly cooled, and as they did, their heat was transferred to the liquid, causing it to boil in relatively little time.

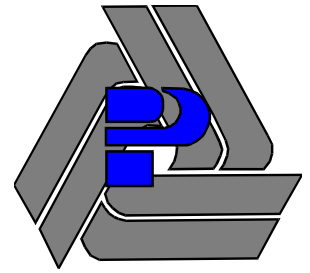
Archaeologists have reproduced this process experimentally in order to study the results. Rocks used in stone boiling are rapidly cooled as they are immersed in liquid. In comparison, stones used in hearths or as roasting stones will usually cool more slowly. Patterns have been observed in experimental results in which slow-cooled hearth stones tend to crack less often or to split into large fragments, while rock used repeatedly for stone boiling will exhibit a crackled or crazed surface and tend to break into small pieces.

One of the ways we are investigating the original use of stone from the hearth-like features at the Hickory Bluff site is by examining the average weight of the fragments. If they are large, they are likely to have been used as hearth stones; if small, they are more typical of highly fragmented boiling stones.

In this picture, the woman has dug a shallow basin and lined it with skin that is pegged to the ground. She drops hot stones into the liquid to make it boil.



Illustration courtesy of Herbert C. Kraft



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Issue 7: Why Do Archaeologists Dig Square Holes?

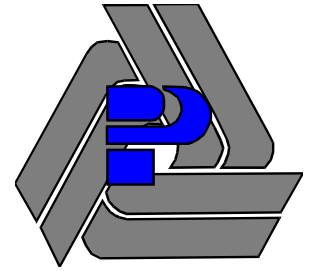
Take a quick look across the Hickory Bluff site and you'll see lots of little orange flags marking spots on the ground, and a series of square holes with string around the edges. It looks like an archaeological site. So, why do archaeologists always dig square-sided holes? Well, it's mainly so that they'll know where they are.

Space is a key idea in archaeology. Where something is found is as important as what it is or how old it is. The location of an artifact within a site tells us its **association**, what it was related to, what it goes with. It's like a puzzle, we have to figure out what pieces go together before we can start to assemble them. For example, if we find charcoal from a campfire or hearth that has a radiocarbon date of 1000 B.C., we want to know whether other artifacts found near the fire were from the same period or whether they were left by people who used the site much later. Or we may find pottery fragments and stone tools in another part of the site. If we know from the style of the pottery that it was made 700 years ago, we can determine that the stone tools are of the same age if we can tell from their locations that they were associated with the pottery.

So, knowing where you are on the site is very important. Sometimes small distances can be critical, and thus, exact and accurate measurements are made of every significant find. In that way, we can reconstruct the site later in the lab, on paper at the least. To make measuring like this practical at a site as large as Hickory Bluff, we create landmarks within the site. The corners of the excavation squares are the landmarks that we use for measurement. They are often called **datum points**, since they are the points from which locational data are collected.

The squares or excavation units are laid out precisely on a grid using surveying equipment such as a transit. The corners of each unit then have a unique identification based on their location relative to a central, or **datum** point. The horizontal positions of artifacts from the corners of the squares are noted, as well as the depths below the surface of the square, giving us exact information about where each artifact was found in relation to all the other artifacts at the site.

STRATA facts



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Issue 7: More on Dates

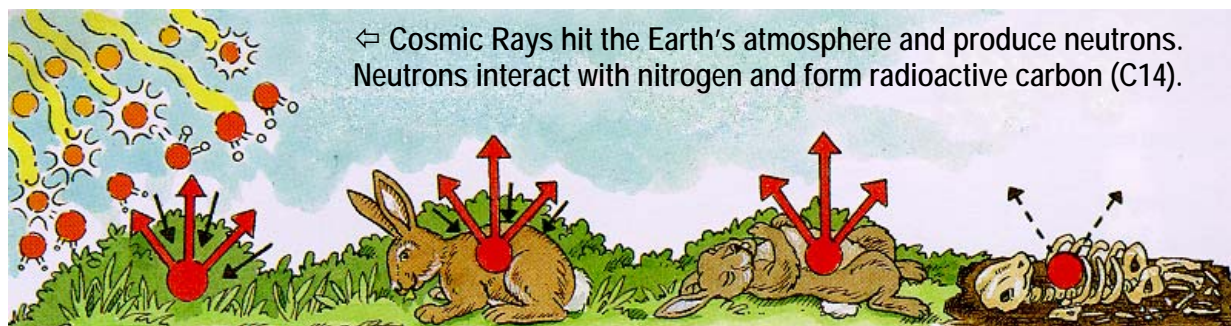
One of the first questions we ask at an archaeological site like Hickory Bluff is “how old is it?” There are several ways of determining the age of a site. The methods range from examining the artifact styles to scientific laboratory procedures such as radiocarbon dating.

Stone Tools and Pottery

Artifacts such as stone tools or pottery were made in specific styles or shapes. Pots often had particular decorations on their surfaces. These styles can be compared within the site, and in a process known as **seriation**, an order or sequence of artifacts can be constructed. The process is based on the idea that artifacts with the greatest similarities in style or design are likely to be closest in age. This provides an estimate of the **relative dates** of the artifacts - their age relative to other artifacts at the site. The ages of some of the styles are known from other sites, and so in a process known as **cross dating**, we can determine the specific ages of some of the material at Hickory Bluff.

Radiocarbon Dates

Radiocarbon dating gives more definite information. In this case it is not the style or form of the artifact that provides the information, but it's chemical make-up. Organic material, or material from things that were once living, such as wood, seeds, bone, or shell, can be subjected to laboratory testing that tell us how long ago the material was alive. This gives us a good estimate of when the material was used - when a tree was cut down for fire-wood, for example. Charcoal is the most frequently dated material. This is because most organic material deteriorates fairly rapidly in the soil. Carbonized material, like charcoal, resists decay and so is more likely to survive to the present. The lab results provide a date that is not dependent on other material from the site, and so the date is referred to as **absolute**, rather than relative. Artifacts that are excavated with the dated objects may often be of the same age.



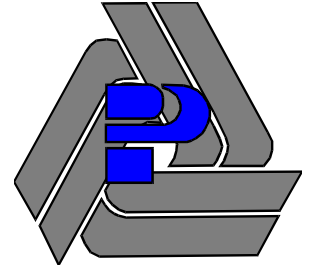
↑ Plants take in radioactivity from carbon dioxide. Animals and humans take it in when they eat plants.

↑ In living plants and animals, the amount of C14 is constant. Dead plants and animals don't take in C14, so radioactivity levels gradually decrease.

↑ It takes 5,730 years for half the radioactive carbon to decay.

↑ The remaining radioactive carbon can be accurately measured in wood and other plant remains and in animal and human bone.

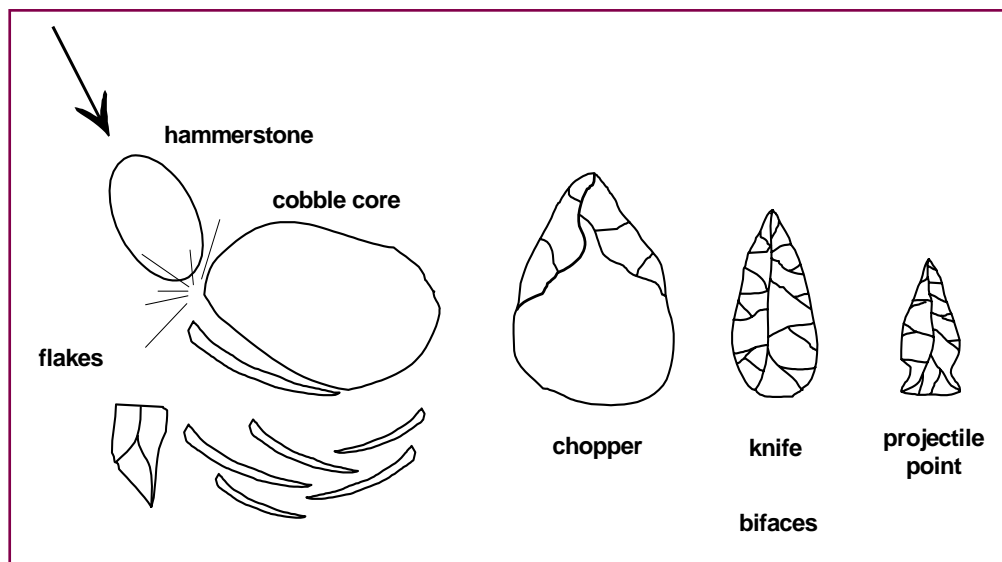
STRATA facts



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Issue 8: Making Stone Tools

Stone was the material from which many of the tools used at the Hickory Bluff site were made. The most common process for making tools from stone involved chipping flakes from a large cobble or angular rock fragment. Flakes were initially removed by striking the edge of the cobble with another rock, referred to as a **hammerstone**. The flakes knocked off the cobble could be used as tools themselves. Occasionally, all that we find at an archaeological site are the exhausted nodules, or **cores**, from which many flake tools were produced.



More sophisticated tools were made by striking the cobble alternatively from two sides or faces, producing a sinuous, **bifacial** edge. As flakes were systematically removed, the object was reduced in size, and so archaeologists often refer to the process as a **reduction sequence**. The resulting bifaces could be used in several forms along the sequence. Large, heavy pieces with relatively few flakes removed from them were used as **chopping tools**. More completely flaked bifaces with straight, sharp edges were used as **knives**, for cutting or scraping tasks. Finely flaked tools were used as the tips of spears or arrows, and are referred to collectively as **projectile points**.

Suggested children's activities

LABEL ARTIFACTS

Indoors or outdoors

Materials

Gravel or other 1-2 inch prevalent rocks

Fine line sharpies

Plastic baggies

This activity is designed to teach children what happens after artifacts have come into the lab, been cataloged and washed. A brief discussion should precede labelling, tailored to the knowledge or lack thereof, of archaeology, that the group already has. Explanations should include an explanation of why archaeologists so carefully keep track of each and every artifact that is recovered in the field. This is also a good place to discuss "value" of artifacts, usually at least one kid will ask "what is an arrowhead worth," and this presents a fine opportunity to explain their worth is not monetary, that information and knowledge cannot have a price tag, and the artifacts mean very little without all of the other artifacts found on site, as well as all the other information recorded during a dig. Then, discussion of how a site gets its number ensues, and a number specific to the group can be created - specific to the number of students, location of activity, etc. Gravels are distributed and carefully labeled, followed by distribution of baggies for the same. Kids should not take these artifacts home, this is an ideal place to explain the importance of the collection, and the artifacts can be placed into a box of some sort, labeled on the outside (maybe all of the junior archaeologists can initial the outside of the box), and prepared for storage.

ARTIFACT ILLUSTRATION

indoors or outdoors

Materials

Artifacts (type collections, or collections used for classroom activity, etc.)

Clip boards

Pencils

Water proof paper

This activity is designed to allow the kids to do some illustration, using the same type of pencils and paper that real archaeologists use. Kids should be told about reports, and that after a site is dug, the information gets analyzed and a report is prepared that anybody can read to learn about the site. Included in this report are illustrations of certain artifacts. Kids love to draw on water proof paper! After the illustration time is up, a fun follow up is to use a disposable camera to record the artifact next to the drawing (let the kids take their own photos), and these pictures can be sent back to the classroom, or the camera left with the teacher to develop and display. The camera twist is nice because we can talk about the photodocumentation that archaeologists must do.

FIELD MISSION

outdoors

Materials

Clip boards

Pencils

Waterproof paper

Tape measures or rulers

Pin flags

This activity is designed to help kids understand the importance of documentation while in the field. A small group (ideally no more than 12-15) accompanies a leader on a "field mission." The leader will have to be enthusiastic, pretending it is the first day on a site, so the group is doing "reconnaissance" of sorts. The leader must get creative, and can pursue the mission in a number of ways, depending on group composition. Arbitrary boundaries will be set, perhaps based on landscape features, and the leader can help set up a grid, allowing kids to help place pin flags in certain places. Then, the idea is to get kids recording things, perhaps even doing a walkover survey, recording surface artifact locations, or simply what the land looks like before digging begins, etc. Trees are a good thing to draw here, explaining why/how tree roots can exist underground and occur in features, same with rodent burrows (examining the ground for rodent traces is another good way to get them really looking at the earth). They love using the waterproof paper, and it keeps them busy for a good while. After the activity, let them dirty up the paper, and tell them to rinse it with water to clean it when they get home.

WHAT DOES CONTEXT MEAN

indoors

Materials

table and chairs

deck of cards

squirtgun

wallet with "identification card"

pocket change

This activity is designed to help kids understand the importance of context, and archaeologists are compared with detectives. While the kids have their backs turned, arrange cards and pocket change on the table in a haphazard fashion, strew chairs about, and place wallet and gun on the floor. The idea is that a killer disturbed a card game, robbed the money people were betting with from the table, and ran out, dropping his gun and his wallet on the way. By making the kids carefully observe and put evidence together (make notes on chalkboard), they should be able to elicit the real story, and figure out what happened. This is like finding an archaeological site intact. Then, have the kids turn their backs again, place chairs against table, or remove them altogether, put cards in deck in center of table, remove pocket change, and place gun or wallet on table, hiding the other. Now, ask if the "real story" can be learned. This is like an archaeological site that has been disturbed by vandals, etc.



Health and safety is always a concern at archaeological sites. Everything from bugs to roots can present harm to archaeologists and visitors. Some very simple precautions can be taken to help you avoid accidents. First, don't ever run when you are on a site, always walk, and pay attention to what the ground is like under your feet. Second, never, ever, walk on wooden boards or tarps, they may be covering very deep holes. Third, use bug spray, wear light colored clothing that covers your whole body, remember, those little critters love to play with archaeologists and visitors, too! Fourth, use sunscreen on exposed skin, and drink plenty of fluids. Fifth, wash your hands with hot, soapy water when you go home, there is usually poison ivy around sites. Archaeology is hard work, but it can be a lot of fun if you follow these simple rules. Thanks for coming out to help explore cultural history!



WELCOME TO THE ARCHAEOLOGICAL EXCAVATIONS AT HICKORY BLUFF!!!

PLEASE SIGN IN BELOW, AND INDICATE WHETHER YOU WOULD LIKE TO PARTICIPATE IN A TOUR, HANDS-ON DIGGING, OR BOTH.

NAME	DATE	ADDRESS	TOUR	DIG

**HICKORY BLUFF ARCHAEOLOGICAL PROJECT
DELAWARE DEPARTMENT OF TRANSPORTATION
DOVER, DELAWARE**

in conjunction with Parsons Engineering Science, Inc.

MARCH-SEPTEMBER, 1998

INDIVIDUAL RELEASE FORM

I understand that any photographs taken of us during our visit to the Hickory Bluff Archaeological site, in Dover, Delaware, may be used for educational purposes. Public participation in Archaeology is supported by Delaware Department of Transportation.

Signature

Date

Address and/or contact number (phone/email)

OPEN INVITATION

to all Cultural Resource Professionals & Archaeologists

See Major Excavations in Action
Visit **Hickory Bluff & Puncheon Run**

Meet your peers, tour the site,
dig with us and share ideas

Enjoy discussions and

- *Public Outreach Program:
schools, clubs, tours
- *The Excavation Strategies, GIS Maps
- *The Artifact Assemblages:
Chipped Stone, Ceramics,
Ground and Pecked Stone
- *Occupations, Radiocarbon Dates,
and the Meaning of Site
Typologies
- *Geoarchaeology and Landscapes
- *Soils and Geochemistry
- *Site Formation Processes
- *Experimental Pits and Observations
- *Feature Analysis, the Pithouse
versus the Tree Throw Debate
- *Tree Stump and Tree Throw
Excavations
- *Paleobotanical and Phytolith Analysis
- *Experiments on Iron Hill Jasper
and Gravels
- *Artifact Mineralogy
- *Organic Residue Analysis
- *Ethnographic Research

And MUCH, MUCH

August 20th and 21st, 1998

8am - 3pm

RSVP card enclosed

Preliminary Agenda will be provided upon positive response

For more information, please contact

Mike Petraglia (703) 218-1084, email Mike_Petraglia@parsons.com
Diane Halsall (703) 934-2339, email Diane_Halsall@parsons.com
Charlie LeeDecker (202) 331-7775, email cleedeck@lba-crg.com

THE HICKORY BLUFF AND PUNCHEON RUN EXCAVATIONS

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 - 100,000+ Artifacts Recovered
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*The field crew will be staying at these hotels. Incidentally, the Ramada has one of the most popular watering holes in the vicinity.

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PROGRAM

ARCHAEOLOGICAL EXCAVATIONS ALONG THE ST JONES RIVER, DELAWARE

The open house event at the Puncheon Run and Hickory Bluff sites in Dover, Delaware is designed to promote and foster communication among professional archaeologists who are interested in the prehistory of the Middle Atlantic region.

The Delaware Department of Transportation (DelDOT) is currently sponsoring large data recovery projects at two prehistoric sites in Dover, located on the banks of the St. Jones River. The Cultural Resources Group of Louis Berger & Associates, Inc. (Berger) is excavating the Puncheon Run Site and the Cultural Resource Department of Parsons Engineering Science (Parsons ES) is excavating the Hickory Bluff Site.

The open house event is scheduled for two days -- August 20 (Thursday) and August 21 (Friday). It should be noted that attendance for 2 days is not mandatory and close adherence to this agenda and schedule is not necessary; you are encouraged to observe on your own, hold discussions with colleagues, or volunteer to screen/excavate. Individuals who can not attend on either the 20th or 21st are welcome to visit the sites during regular work hours (Monday-Friday, 8 am to 3 pm).

Health and Safety: Please note that the archaeological sites are spread over 25 acres and occur on diverse terrain -- Health and Safety is of utmost importance. Please dress appropriately, be prepared, and remember to bring a hat for sun, sunscreen, boots, and plenty of fluids for drinking. Poison ivy and ticks are present on the sites, and there are many open units and trenches.





2-DAY AGENDA HICKORY BLUFF AND PUNCHEON RUN SITES

Day 1, AUGUST 20, Thursday Morning

8:00 am, Meet at DelDOT HQ, Route 113 (see map) -- at steps in front of the main entrance.

TOPIC	TIME	PLACE	PERSON
Welcoming Remarks & Introduction	8:15	DelDOT HQ	Kevin Cunningham
The Delaware SHPO	8:30		Dan Griffith
Proceed on foot to Hickory Bluff	8:45		
Delaware Research Designs	9:00	Hickory Bluff	Gwen Davis
Overview of Excavations	9:15		Mike Petraglia, Dennis Knepper
Artifact Exhibits -- Emphasis on Lithics and Mineralogy	9:30		John Rutherford, Philip LaPorta
The Public Program	9:45		Diane Halsall
Tour the Site, Discussion on Features, Geoarchaeology	10:00		Mike Petraglia, John Rutherford, Dan Hayes
Tree Excavations	11:30		Karen Supak
LUNCH BREAK <i>Lunch will be provided at Hickory Bluff</i>	12:00		





AGENDA
PUNCHEON RUN AND HICKORY BLUFF SITES

Day 1, AUGUST 20, Thursday Afternoon

TOPIC	TIME	PLACE	PERSON
Proceed via motorcade to the Puncheon Run Site	1:00		
Introduction & Overview in Locus 1	1:15	Puncheon Run Locus 1	Charlie LeeDecker et al.
Geological Setting	1:45		Dan Wagner
What Can We Learn from Ethnography?	2:00		John Bedell
Subsistence Issues -- Protein Antisera for Locally Available Species	2:15		Rob Jacoby
View & Discuss the Features, Soil Anomalies	2:30		Rob Jacoby, John Bedell et al.
Subsistence Issues- Flotation Studies	3:15		Justine McKnight

Head to Favorite Watering Hole -- Dialogue! Partner! Gossip! Schmooze!





**AGENDA
PUNCHEON RUN AND HICKORY BLUFF SITES**

Day 2, AUGUST 21, Friday Morning

*8:00 am, Meet at DelDOT HQ, Route 113 (see map) -- in conference room,
inside main entrance.*

TOPIC	TIME	PLACE	PERSON
Welcoming Remarks & Introduction	8:15	DelDOT HQ	Kevin Cunningham
SHPO -- Current Topics	8:30		Gwen Davis, Faye Stocum
Introduction to the Puncheon Run Site	8:45		Charlie LeeDecker
Proceed via motorcade to Puncheon Run	9:00		
Overview of Excavations in Locus 3	9:15	Puncheon Run Locus 3	Charlie LeeDecker et al.
Tour of the Excavations	9:30		Rob Jacoby, John Bedell et al.
Soil Chemistry Studies	10:30		Dan Wagner
Landscape Reconstructions and Ethnographic Studies related to Subsistence	10:45		Justine McKnight
Excavation of a Ground Hog Den	11:15		Rob Jacoby
Proceed to DelDOT HQ	11:30		
LUNCH BREAK <i>Lunch will be provided inside HQ</i>	11:45	DelDOT HQ	





**AGENDA
HICKORY BLUFF AND PUNCHEON RUN SITES**

Day 2, AUGUST 21, Friday Afternoon

TOPIC	TIME	PLACE	PERSON
Statewide GIS Project	12:15	DelDOT HQ	Mike Townshend, Alice Guerrant
GIS, the Internet, Web Site	12:25		Mustafa Cayci
Proceed on foot to Hickory Bluff	12:45		
Overview of Excavations	1:00	Hickory Bluff	Mike Petraglia, Dennis Knepper
Artifact Exhibits -- Emphasis on Ceramics	1:15		Chris Egghart, Carter Shields
Public Outreach -- Material Handouts	1:30		Diane Halsall, Sulah Lee
Tour the Site, Features, Geoarchaeology & Geochemistry	1:45		Mike Petraglia, John Rutherford, Dan Hayes
Experimental Pits* (Small Group)	2:45		Karen Supak
Artifact Mineralogy* Material Gravel Study Pebble Reduction Experiments	2:45		Philip LaPorta, J.T. Marine, John Rutherford
Wrap-Up	3:15		Kevin Cunningham, Dan Griffith

*the sessions on experimental pits and artifact studies will be held concurrently.



The Symposium: *The Hickory Bluff Site: Hallmarks and Changing Perceptions of Delmarva Archaeology* was conducted on Friday, April 7, 2000 at the Society for American Archaeology 65th Annual Meeting in Philadelphia, Pennsylvania. The Symposium was organized by Kevin W. Cunningham, DelDOT and Dr. Michael Petraglia, Principle Investigator, Parsons; Kevin Cunningham served as the Chair. Thirteen professional papers were presented by the DelDOT and Parsons technical team and were based on early preliminary analyses of the Hickory Bluff data. Dr. Michael Stewart, Department of Anthropology at Temple University, Philadelphia, Pennsylvania and Dr. Daniel Griffith, Delaware State Historic Preservation Officer, Dover, Delaware were the discussants.

The text portion of the symposium papers and discussant comments are provided below in the order of presentation.

Room 304, 1:00 - 4:45 PM

Symposium/*The Hickory Bluff Site: Hallmarks and Changing Perceptions of Delmarva Archaeology*

Organizers: Kevin W. Cunningham & Michael Petraglia

Chair: Kevin W. Cunningham

Participants:

- 1:00 Michael Petraglia-The Hickory Bluff Site: Hallmark, Research Goals, and Changing Site Perceptions
- 1:15 Diane Halsall-Maneuvering the Public; A Simple Site Visit Goes a Long Way
- 1:30 Charlie Clark-A Native American Perspective on the Archaeology at Hickory Bluff
- 1:45 Virginia R. Busby-On the Threshold: Turning the Experience of Archaeology in the Middle Atlantic
- 2:00 John Rutherford and Dennis Knepper-Chronology, Material Culture, and Occupation Cycles
- 2:15 Daniel R. Hays and G. William Monaghan-Geoarchaeological Investigation at Hickory Bluff: Site formation and Preservation within a Changing Holocene Landscape
- 2:30 Robert P. Meyer, Jr.-Experimental Archaeology: Intimate Relations between People and Nature
- 2:45 BREAK
- 3:00 Kevin Cunningham and Chris Egghart-Semi-Subterranean Pithouse Blues: Cultural Construction and/or Natural Features, Multiple Working Hypotheses
- 3:15 Justine Woodard McKnight-Prehistoric Subsistence on Delaware's Coastal Plain: Observations on the Paleoethnobotanical Assemblage from the Hickory Bluff Site
- 3:30 Chris Egghart and Carter Shields-The Hickory Bluff Lithic Assemblages: Stone Artifacts in an Outcrop Deficient Zone
- 3:45 Sean P. Fitzell and Dennis Knepper-Spatial Distributions and the Notion of Site Typology
- 4:00 Victoria Robertson, Carter Shields and J. Sanderson Stevens-The Hickory Bluff Ceramic Assemblages, Chronology, and Social Boundaries
- 4:15 Susan Bupp-Hickory Bluff and the St. Jones River Landscape
- 4:30 Michael Stewart-Discussant
- 4:45 Daniel Griffith-Discussant

HICKORY BLUFF: HALLMARKS, RESEARCH GOALS, AND CHANGING SITE PERCEPTIONS

By
Michael Petraglia

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Cultural Resources Department
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Presented at the Society for American Archaeology, April 5-9, 2000, Philadelphia, Pennsylvania

INTRODUCTION

Much has been learned about the prehistory of the Middle Atlantic during the last 25 years, due in part, to the growth of large-scale Cultural Resource Management studies. Archaeological excavations conducted by the Delaware Department of Transportation along the Route 1 corridor are a good example of research gains on Delmarva prehistory. The Hickory Bluff excavations are but one of the latest mitigations conducted as part of DelDOT's long-term effort.

The Hickory Bluff Site is located in the Low Coastal Plain of Delaware, 6 miles west of the Delaware Bay and 38 miles east of the Chesapeake Bay. Hickory Bluff occurs on the east bank of the St Jones River, on a prominent high spot at a major bend in the river. Occupations on the St Jones River primarily date to the Late Archaic, Early Woodland, and Middle Woodland. This period evidenced great changes in material culture and an increase in sedentism and food production. It is during the Early Woodland that the Delmarva Adena Complex flourishes, a 500 year period associated with more elaborate social organizations. Interments in the nearby St Jones Adena Mound and the Frederica Adena Site show that certain individuals attained special status, as exemplified by burial accoutrements (Jones 1965; Thomas 1976). The burials and caches of exotic bifaces have been related to Adena sites located as far distant as the Ohio River Valley.

THE HICKORY BLUFF SITE AND ASSEMBLAGES

The Hickory Bluff investigations are among the broadest excavations conducted in the Mid-Atlantic. The site is situated over a 5 acre area where over 800 one-meter excavation units were placed. Thus, the extensive excavations provide us with an opportunity to examine site structure as well as sequential site expansions by temporally separated occupations (see O'Connell 1987).

A large number of features were excavated at Hickory Bluff, totaling to 150 in all. This included over 100 basins, 40 thermally altered stone clusters, and 6 artifact concentrations. These features may be referred to as "structural features" (Petraglia and Knepper 2000); that is, features which can be clearly observed in the field due to their spatial clustering, arrangement or concentration. In addition to this are dozens of latent features which were recognized through computerized pattern recognition studies. Latent features consisted of concentrations such as lithic debitage, raw material, and ceramics. The broad array of feature types and their spatial relationships thus provided for a good understanding of space use and activity variations.

A large and diverse assemblage was recovered from the Hickory Bluff site, which totaled to some 85,000 artifacts, thus representing one of the largest excavated collections in Delaware. This included 37,000 flakes and chips, 37,000 thermally altered stones, 8,000 ceramic sherds, 500 cores, 250 projectile points, 250 bifaces, 100 cobble tools, and 60 unifaces. The temporally diagnostic points and ceramics indicate major phases of occupation dating to the Late Archaic, Early Woodland, and Middle Woodland, although other temporal phases are represented by small assemblages. A battery of 20 radiocarbon samples placed site occupation from 4,500 years BP and up through the historic period. The majority of prehistoric dates clustered from 2800 to 1000 years BP indicating predominant periods of site occupation. Thus, the recovery of

substantial assemblages ranging over the Late Archaic through the Middle Woodland provides us with the opportunity to address many questions about material culture, as well as questions of function, societal relations, and cultural change in the Delmarva.

The ceramic assemblage is a high-quality data set, mainly consisting of Marcey Creek, Wolfe Neck, Coulbourn, and Mockley types. As one of the best provenienced ceramic assemblages of Delaware, the ceramics provide us with an opportunity to address questions of procurement, manufacture, style, and social interactions. Cross-mending also provides information about the number and characteristics of the vessels on site and it is a key variable in assessing the spatial layout of occupations.

With respect to lithic technology, it was found that many of the stone tools were produced from the local Columbia Formation gravels found on site, supported by tested cores of pebbles and cobbles, early stage bifaces, and the abundance of cortical debitage. This indicates the importance of local procurement compared to direct bedrock quarry procurement or trade and exchange from distant piedmont locations.

The size and diversity of the point assemblage was impressive, and consisted predominately of types that may be identified as Bare Island, Lackawaxen, Susquehanna Broadspears, Rossville, Adena, Selby Bay, Fox Creek, and a series of small stemmed points that are likely of Early to Middle Woodland affiliation. Given the morphological variations and the quality of the point data set, the assemblage was considered ideal for addressing questions of manufacture, style, and function.

CHANGING SITE PERCEPTIONS

The broad excavation strategy, the recovery of high quality assemblages and features, together with our Public Outreach and Native American interactions, stimulated us to re-address traditional research questions that are often posed in Middle Atlantic research. These observations and experiences encouraged us to think in alternate ways about material culture, the formation of the site, and the cultural role of Hickory Bluff in a cultural context. As we all recognize, archaeology as a discipline is currently undergoing many re-evaluations and much change in the way in which it is practiced. In examining elements of current processual, postprocessual, and chaos theory¹, we have devised an umbrella concept which takes strengths of certain approaches currently being debated in the general literature. This concept asserts that “the material record of humanity is variably composed of economic, social, and religious processes—and these processes operate in evolutionary, system-wide and individual, historic levels, and in non-linear fashion”². While we have developed a conceptual framework which can guide our research, we also wish to operationalize and test elements of this holistic concept in a real-world situation such as at Hickory Bluff³. We therefore address elements of this conceptual framework here on multiple analytical levels, including an examination of artifact assemblages, features and their spatial relations, and the position of the site in a wider cultural context.

Artifacts

An analysis of the Hickory Bluff's projectile points indicates relations between certain variables and the morphology of the end-products—but the analysis also suggests the amalgamation of complicated sets of variables that result from systemic and particularistic (i.e., individual, historic, nonlinear) expressions. For example, we have related point size and morphological characteristics to raw material types and gravel dimensions. Furthermore, point tip angles, symmetry, and edge characteristics may be related to an increasing level of retouch and edge rejuvenation. However, despite a comprehensive point analysis, we are left with a lack of corroboration with our expectations, and we are uncertain if any single variable will ever elucidate final form. We believe that this is a consequence of the amalgamation of many factors which operate on tool forms, such as natural conditions, socio-cultural style, individual variations, and particular use life events. Thus, we suggest that an integrated and fluid set of factors are also responsible for point morphologies, each of which cannot easily be isolated. We therefore suggest that while general point forms may share some characteristics in a regional and cultural framework, the final form of each object is a specific manifestation of local conditions and events.

Features and Formation Complexity

With respect to feature characteristics, a main point is that certain features can be shown to share certain morphological characteristics. However, general categorizations, while adequate on some descriptive level, also hides much variability in shape and formation histories. That is, features show large differences in their shapes and contents, thus indicative of use variations and divergences in depositional histories. Some features are apparently single function events, whereas others show variable degrees of multiple event behaviors, thus introducing overlaps and re-use behaviors occurring in one or more occupations. Often minor variations and subtle nuances are critical in differentiating various activities, thus precluding simple functional categorization.

As a demonstration of wide differences in the formation of features, the thermally altered stone clusters show some marked differences which signal activity and use-history variations. The variations are documented in spatial size and spread of rock features, clast sizes introduced into features, differential reddening and breakage of materials of various types, and differences in the degree to which fractured rocks reassemble. For example, this feature, Feature 46, had visible boundaries and it contained large, heavily fractured rocks, with few refits. In the case of another feature, the thermally altered stone consisted of a broad scatter of unbroken but heated pebbles. And another consisted of a tight cluster of large and heavily cracked pieces which mend together to form one partially reconstructable boulder.

With respect to the 100 or more basins we have much variability as well. It should be noted from the outset that an issue here concerns the Delaware feature “debate”. Jay Custer (1994) interpreted hundreds of basin features at various sites as pithouses. This model was critiqued by those who favored tree throws to account for feature formation (Mueller and Cavallo 1995). Previous work at the Hickory Bluff site by Hunter Research in fact identified numerous pithouses, seemingly in support of Custer's interpretation (Liebknecht et al. 1997). Given this

background, our research at Hickory Bluff decidedly became open to various interpretations and we tackled the issue of basin formation as comprehensively as possible studying variations in size, shape, and contents. We initially revisited some of the identified soil anomalies originally interpreted as pithouses, and quickly recognized that some of these were Columbia Formation geomorphic anomalies and were thus of Pleistocene age. This said, it is also true that some of the basins in the Hickory Bluff have a more complex formation origin and history. For example, Feature 90 was a large and deep basin with 800 artifacts of diverse types. This is opposed to Feature 118 which was a large basin of a different size, shape and depth, but which primarily contained only ceramic sherds. We see much variability in the size, shape, and contents of basin features, thus we suspect that their formation is quite variable.

Further complicating feature interpretation, we have found that it is not straightforward to interpret the origin of a feature, as we have evidence for a combination of natural and cultural processes operating in many contexts. We have observed that cultural and natural processes interact in inter-twined and detailed ways, thus there is a range to be expected in feature formation, with processes often difficult to singularly separate. This is evident in our experiments on feature degradation and deposition and in our excavations of tree rots and tree throws. In the experimental features, we found that basins are attractions for plants and trees, thus we infer that overlaps between these processes should be normal and anticipated. As a result, during our archaeological excavations, we have opted to observe and discuss all patterns, recording tree rots, root penetration, animal burrows, voids, and other soil anomalies. We see feature origins and formation as complex. Single explanations for their origin are insufficient, whereas a variety of cultural and natural processes may better account for the patterns we observe.

Feature Interpretations—Multiple Behaviors

Interaction with the Nanticoke Tribe, originally stimulated as a result of our broad-scale Public Outreach efforts, led us to re-address some of our basic assumptions about feature formation prompting us to more carefully consider social and ceremonial contexts. As routine archaeological practice, it is often the case that features are described and interpreted in implied economic, residential, or food-associated terms and assigned types such as “residence”, “hearth”, “processing pit”, “earth oven”, “storage pit”, and “refuse pit”. However, our experiences with the Nanticoke, together with the rich and substantial ethnohistoric records which discuss many behaviors, lead us to reconsider the material fall-out of social and ceremonial processes and events. As an example of one such material fall-out, our ceremonial sweat lodge experience with the Nanticoke was provoking, and stimulated us to consider archaeological consequences. This was particularly striking upon witnessing the aftermath of the sweat lodge ceremony and the resultant site structure and the rock features. Here we have a great variety of thermally altered stone features each having a different set of thermal characteristics, but all of which resulted exclusively from ritualized behavior. We suggest that significant material residues may result from social and religious domains, and economic behaviors do not exclusively form the features we may be commonly excavating at Hickory Bluff and at other sites.

Ritual and ceremonial behavior may be considered for caches at Hickory Bluff. Caches such as this one may contain objects and tools which likely functioned in an economic realm during their

use lives. However, the context of these particular finds suggests deliberation that transcends straightforward functional interpretation. One example, side-by-side basins, have a single capping stone. Once removed, one of the pits contained specialized implements, including battered and pecked objects flanked and interred with large mendable ceramics. However, once the objects were placed and the pit and marked with the capping stone, this feature was not revisited. In reading into this a bit further, a supposition can be made that caches found at Hickory Bluff and at other sites (such as biface cache at Carey Farm, Custer et al. 1995) are connected to spiritual dimensions and not connected to mobility or economic behaviors. The rare and special finds of gorgets and an ulu also provide potential information about symbolism and human choices. These items are carefully crafted and artistically incised conveying individualistic human expressions. The items were all broken, suggesting discard of unrepairable items. However, given the rarity of these items and the great care placed in their manufacture, it is plausible that they were intentionally broken as part of ritualized acts, as has been suggested for fragmented gorgets and other items in burial context (Thomas 1976).

Taken together, the fire-cracked rock features and their potential non-economic functions, the evidence for caching and offerings, and the identification of some rare but special artifacts such as deliberately broken gorgets and ulu, suggest that Hickory Bluff represents more than just a place which functioned exclusively in a settlement-subsistence system.

HICKORY BLUFF—MULTIPLE MEANINGS IN CULTURE CONTEXT

Switching now to the role of Hickory Bluff in cultural context, the occupations may be examined in temporal and synchronic frameworks. Taken together, the archaeological evidence primarily indicates occupation over the Late Archaic, the Early Woodland, and the Middle Woodland. As generally known, this time period is marked by significant societal changes and dramatic modifications in material culture. Thus, Hickory Bluff represents a virtual laboratory for examining cultural continuity and change for the St Jones watershed and the Delmarva in general.

The setting of Hickory Bluff on the St Jones may be related to the synergistic operation of multiple domains connected with economic, social, and religious behaviors. Hickory Bluff occurs in a highly productive ecological zone, where plant and animal resources would have been present in some abundance, hence these resources would have provided sustenance in a subsistence and settlement economy. Such a high biomass zone is of interest for addressing religious dimensions, as such a zone would coincide with traditional Native American belief systems which view nature and natural resources as the embodiment of a symbolic world. Thus, Hickory Bluff, from this perspective, can be conceived of as a spiritual place in a Native American worldview. This traditional behavior would likely have operated throughout the course of Native American habitation of Hickory Bluff, although the degree to which this is materially expressed through time would vary. The position of Hickory Bluff on the St Jones River reinforces an association with the non-secular. An interesting observation on site context can be made by examining the Hickory Bluff viewshed. It can be demonstrated that the archaeological site location corresponds with the maximum sight lines both upstream and downstream along the bend of the St Jones. This intersection may have an association with

Native American cosmology. The maximum expression of ceremonial and social expression may be during the Adena period of site use. The position of Hickory Bluff is not fortuitous in that it is part of a significant cluster of Adena sites along the middle portion of the St Jones River, the most symbolically important being the St Jones Adena Mound. Dennis Curry (1999) discusses many parallels of site setting that are shared with Hickory Bluff for Late Woodland ossuaries although they are different site types and ages. This includes location on the middle ranges of major drainages, in prominent high spots with excellent visibility, a setting in relatively protected areas facing open water--which is often viewed to the west and in a canoe-navigable setting. Based on these various lines of evidence, it is posited that Hickory Bluff's location and its spatial position on the riverine landscape carries symbolic, social, and ceremonial meanings, which achieved maximum material expression during the Adena phase of site use.

The position of Hickory Bluff has implications with respect to territorial and sociopolitical interactions. Brian Hayden's (1998) aggrandizer model has bearing here in that it posits that societal complexity is marked by both organized system-wide behaviors and the increased importance of particular individuals. With respect to this, we agree with Dent (1995:268-271) who remarks that segmented tribal social organizations become expressed during the Late Archaic, and Big Man societies, characterized by persons who achieve distinct status, became established by the Early Woodland. Regarding system-wide spheres, during the Adena phase, the St Jones sites are participating in a larger territorial network centered in the Ohio River Valley. However, the St Jones socio-cultural developments and interactions should be viewed as unique for the Delmarva, which is in a peripheral boundary. That is, compared to the Ohio core area, the development of the Delmarva Adena phenomenon would thus have some specific features which grew out of locally antecedent Early Woodland culture and the particular conditions found in the St Jones geographic area (see Cobb 1991 for an example of historic development). Certain persons and personalities probably had important effects on these systems, as demonstrated in their specialized interments, grave goods, and cached commodities—which can be viewed as expressions of the power, control, and prestige. Hickory Bluff is a part of a culture which thus placed increasing attention on prestige goods, items of which had specific meanings in an Adena value system as defined and expressed extra-regionally and locally.

ENDNOTES

1. Many archaeologists now agree that there are many avenues in exploring the past and that the New Archaeology, as traditionally defined, can no longer be viewed as the exclusive means for understanding the past (e.g., Schiffer 1995; Hodder 1999).

Much of North American and Mid-Atlantic archaeology during the past three decades has been dominated by a *processual* paradigm. Processual archaeology holds that relations between material culture and human behavior could be used to explain cultural systems and evolutionary changes, viewing human responses to be adaptations to environmental conditions and changes. Binford (1962) recognized that the archaeological record was an amalgam of technomic, sociotechnic, and ideotechnic phenomena, with the idea that a scientific study of system-wide organization would provide information about cross-cultural adaptation. While many

practitioners of the New Archaeology formalized the approach, much of the work became dominated by an ecological approach. An unfortunate effect of this perspective was its narrow focus on cultural ecology, and the relative lack of attention paid to social and religious factors, which have an important place in behavior (e.g., Brown 1953, 1982; Hultkrantz 1967; Tooker 1979; Rappaport 1999) and which have material manifestations as is becoming increasingly recognized (e.g., Carmichael et al. 1994; Kelley and Francis 1994; Ehrenreich et al. 1995; Skibo et al. 1995; Hall 1997; Hayden 1998; Costin and Wright 1998). Behavioral archaeologists advocated the study of behavior and material “in all times and all places”, also recognizing that past phenomena could be described in historical and nomothetic perspective (Reid et al. 1975:864). While Schiffer (1988) advocated a social theory, this has not been articulated since much work has been conducted on correlates in a technological realm, although recent work seems show a desire to address ideological realms (Skibo et al. 1995). Evolutionary schools of thought (i.e., Selectionist, Evolutionary Ecology) (e.g., Dunnell 1980; Barton and Clark 1997; Broughton and O’Connell 1999) advocate the study of relations between ecological variables and adaptive responses, although the mechanisms for change are viewed quite differently in each approach.

Mid-Atlantic prehistoric archaeology is often conducted under a processual culture-ecology paradigm (e.g., Gardner 1989; Custer 1989), as stated by Custer (1989:23), “Many archaeologists are drawn to anthropological theories that focus on how human cultures adapt to their natural environments”. The culture ecology approach guides much Delmarva research, as demonstrated by Custer in seeing “similar” adaptive responses; for example, formerly divided material culture units (e.g., Paleoindian-Early Archaic; Late Archaic-Early Woodland-Middle Woodland) are collapsed into “adaptive” units (Paleoindian; Woodland I). Custer suggests that there are similar ecologically induced cultural adaptive systems for these reformulated units. If there are any attempts to move beyond any ecologically adaptive and economic system descriptions in the Mid-Atlantic, it is usually in burial contexts where symbolic meanings may be more readily inferred, although exceptions are emerging (Hantman 1990; Jirikowic 1990; Dent 1995:10-16).

Postprocessualism has had an important effect in archaeology in that it has emphasized the role of individuals in actively negotiating in their own culture, and it places emphasis on contextualism, where local factors, the individual, and the agent led to particular historic events within networks. Hodder (1999) advocates the study of the individual, (disregarding nomothetic rules of behavior), with the recognition that behavior is often expressed in a symbolic realms, and that these are conducted in particular historic contexts. Hodder (1986, 1999; Hodder et al. 1995) has advocated the interpretation of artifacts within their extinct context of meaning, a meaning which historically constituted (see also Reid 1995). Especially with respect to increased societal complexity, postprocessualism has special appeal as it recognizes the role of human choice, power relations, and social structure.

With respect to archaeological site formation and current methodology, Schiffer (1987) emphasizes that behavior and residues are “regular” and “predictable” and Binford (1983) has often argued that behavior is “organized”, often operating under environmental conditions. For example, Schiffer (1987:21) states, “The occurrence of specific formation processes is determined by specific *causative* variables, making these processes highly predictable.” “The

effects of specific processes--their traces--are themselves regular and predictable”. On the other hand, **Chaos theory** posits that complex, dynamical systems show order, but they never repeat. Applying this concept to behavior, it could be argued that actions never repeat and they are affected by small changes in conditions. For instance, history could be considered aperiodic--broad patterns in the rise and fall of complex societies may be sketched--but while this is the case, no rise and fall events ever repeat exactly. Thus, archaeologists have begun to find appeal in this concept, applying this theory to understand behavior and the formation of artifact assemblages and sites (MacLeod-Iredale 1998; Grace 2000).

2. This concept embodies all material relations occurring among economic, social, and religious spheres. It provides the framework for seeing many behavioral interconnections, and it sees their evolutionary and historical trajectories as an infinite cycle of life that needs to be explored on multiple explanatory levels. This conceptual framework rests on major tenets of current theory, but it recognizes some of the failures of sometimes narrowly focused schools of thought, and it reformulates some of the best of these schools, taking strands of them and using it as a broad, but particular way of addressing the past.

With respect to definitions for this conceptual framework, “Material record” is the study of all artifacts of any age currently known to begin at 2.6 myr to the present. “Humanity”, encompasses all hominids that leave material traces (*Homo*, *Australopithecus*). “Variably composed” signals the concept of diversity prevalent in archaeology, but it also is used here to recognize variable degrees of inter-change and integration of behavioral inter-relationships. The tripartate term, “Economic-social-religious”, terminology recognizes the significance of each of these domains, and the ordering is deliberate, in that, in a diachronic and functional sense, economic behaviors (e.g., food-getting strategies) are basic, core issues that characterize humans and all living creatures; social processes characterize mammals and Primates, but the level of sophistication of human social behavior becomes more complex and diversified through time; religion is used in the most generic sense, encompassing simple cognitive thoughts and ideological expressions; reverence and belief in the supernatural; and formalized worship structures. The tri-partate term and its order does not carry a directional weighting, since, for example, strict formalized religion may pervade every aspect of archaeological phenomena (i.e., both economic and social). “Evolutionary” recognizes the importance of studying the human record and the process of change, and that this may be studied in “system-wide” cross-cultural contexts that do operate similarly at a high level organization. “Individual” recognizes that each artifact and each arrangement is made up of single actions or multiple actions, events of which can be examined in a “Historic” framework. “Non-linear” recognizes that behavior and material culture is ordered, but that this order is chaotic and unpredictable, indicative of a greater level of complexity than often articulated.

3. As in all concepts or theories, the main challenge is to see how elements of this can be operationalized and brought to bear in particular contexts such as at Hickory Bluff . While general theory and conscious attempts to address paradigm conflicts are relevant, few theorists have applied their expectations to the comprehensive study of actual prehistoric sites and/or materials (for an exception, see Hayden 1996, Hayden et al. 1996). Certainly, theorists do study particular *aspects* of material phenomena, Binford (1983) focuses on site structure and has examined faunal remains extensively; Schiffer (1987, 1995; Skibo and Schiffer 1995) has

examined life histories of artifacts, ceramic technology, and behavioral narratives such as on the electric car; and Hodder (1999) has examined particular artifacts or contexts (similar to Leone's [1984] particularistic focus). Given this, it is important to analyze an important unit—the site—to see how theories can be operationalized at all levels.

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